STANDARD OPERATING PROCEDURE: 2 IN/ 2 OUT COMPLIANCE FOR THE EL PASO FIRE DEPARTMENT

EXECUTIVE DEVELOPMENT

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ABSTRACT

In January 1998 Federal Occupational Safety and Health Administration (OSHA) issued 29 Code of Federal Regulations (CFR) Parts 1910 and 1926, Respiratory Protection Final Rule. The El Paso Fire Department did not have a method for meeting interior structural firefighting regulations. The rule required a buddy system for entrance into an IDLH environment and personnel on standby, outside the environment, for rescue.

The purpose of the research was to produce policy designed to meet OSHA regulation. Evaluative research was used to analyze policies from other departments and local policies. Action research was used to create new policy and evaluate operations.

Four research questions were identified:

1. What did the OSHA regulation require, directly or by implication?
2. What methods were used by fire departments to satisfy the OSHA regulation?
3. What methods were adaptable to resources available to the El Paso Fire Department?
4. Did performance in El Paso Fire Department allow the OSHA regulation to be met with minimal changes?

Several procedures for gathering data were utilized. A literature review included references from the National Fire Academy (NFA) Learning Resource Center (LRC), the author's library, the International Association of Fire Fighters (IAFF) and Internet sites. A 15- item survey sent to 90 fire departments across the nation included a request for their policy. Sixty-two replies were received with 21 copies of policies. Local incident records for a six-months were reviewed. Field research was used to estimate task completion times.

The results of this research indicated the need for policy reflecting the new interior firefighting standard. Department manuals needed consolidation. Methods used by other departments were in place but not related to all interior fire fighting.

Based on review of the regulation, department and other agency policies a recommended policy was assembled. The policy consolidated existing procedure, met the regulation and increased safety on the fireground.

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INTRODUCTION

On January 8, 1998 Federal OSHA announced the issuance of 29 CFR Parts 1910 and 1926, Respiratory Protection Final Rule. The final rule became effective April 8, 1998. The rule does not apply equally to all states.

The Occupational Safety and Health Act of 1973 applies in OSHA states only to federal fire departments and private fire brigades, not to the public sector. In the 23 "state plan" states that a comparable standard must be adopted within six months of the issuance of a final rule. These state plans carry the weight of state law and effect both private and public fire departments.

Twenty-nine CFR Parts 1910 and 1926 are a comprehensive respiratory protection regulation encompassing all aspects of respiratory protection in the workplace. The regulation includes standards for respiratory equipment, personnel training, medical evaluations,

maintenance of equipment and record keeping as well as structural firefighting safety requirements. The paragraphs this research is centered around are 1910.134 (g)(3) Procedures for Immediately Dangerous to Life and Health (IDLH) atmospheres and (g)(4) Procedures for interior structural firefighting.

Paragraph (g)(3) contains procedure for IDLH atmospheres. The employer shall ensure that one or two employees are located outside the IDLH atmosphere. Visual, voice or signal line communication is maintained between those inside and those outside the IDLH atmosphere.

Those outside the IDLH area are trained and equipped for rescue. Paragraph (g)(4) contains additional requirements for Interior structural firefighting.

Interior structural firefighting, dealt with in paragraph (g)(4), requires at least two employees enter the IDLH atmosphere and remain in visual or voice contact at all times. At least two employees are located outside the IDLH atmosphere. All employees involved must use (SCBA). One of the employees outside may be engaged in other activities as long as the activity can be abandoned on a moment's notice without posing a threat to the safety of other employees. One of the outside personnel must remain vigilant as to the condition of the interior group at all times.

An example of the type of incident prompting this regulation is to be found in *Incident number 2*: *OSHA Investigations of Firefighter Fatalities, 10/1/91 – 3/17/97: IMIS*. A team of two firefighters was working the interior of a structure fire. Conditions deteriorated causing dense smoke. The team lost contact, resulting in the death of one firefighter. A series of firefighter deaths in eight cities prompted the IAFF to push for the rule.

Dubbed the "2In/2Out" rule, regulation 1910 paragraph (g)(4) has been received with a mixed reaction from the fire service. Many chiefs feel the resources to implement an interior fire attack in a timely fashion will be unavailable. Others welcome the rule as a significant development toward firefighter safety. "More rescues won't be made and more property damage will occur as a result of this rule.

We brought this on ourselves. When the fire service continually kills a hundred or more firefighters a year without any real successful reductions, then somebody had to step in and make us do a safer job." (Baltic, 1998, p. 44)

Federal OSHA has no direct enforcement authority over state and local governments in states that do not have state OSHA plans. However, IAFF and International Association of Fire Chiefs (IAFC) committees have identified the rule as the minimum acceptable standard for safe fire ground operations for all firefighters when SCBA is used. A legal opinion submitted by Mary Ellen Heben, Senior Attorney for the Toledo, Ohio Law Department stated, "The '2-in, 2-out' regulation does set the current 'standard of care' for firefighters and is a strong safety precedent which could be used as evidence of the industry standard in court proceedings." Local agencies choosing to disregard the rule as inapplicable to them may enjoy an unpleasant experience in a court of law, regardless of their geographic location in a state without a "state plan".

Scope of Research

The scope of this applied research project is limited to the examination of the personnel requirements for operations included in the OSHA Respiratory Protection rule. El Paso Fire Department had previously met or exceeded requirements for SCBA usage, maintenance, record keeping and training. It is probable that meeting the letter of the law is not sufficient to ensure safe operations in IDLH atmospheres, and increased resources are needed to do so. This project

endeavors to find the most realistic solution to creating local standard operating procedures in compliance with the identified portions of the rule.

Problem

The problem is that El Paso Fire Department, as of December 1998, has not issued a policy regarding the Federal OSHA rule published in January 1998. The rule is 29 CFR Respiratory Protection, part 1926 and 1910 paragraphs (g)(3) and (g)(4). These specific parts of the rule refer to personnel required for entry into IDLH atmosphere environments. Interior structural firefighting is dealt with in 1910 paragraphs (g)(3) and (g)(4).

Purpose

The purpose of this research is to produce policy and standard operating procedure for the El Paso Fire Department designed to meet the requirements in OSHA CFR 29 Respiratory Protection part 1910 paragraphs (g)(3) and (g)(4).

Research Method

Both evaluative and action research methods were used. Evaluative research for reviewing the OSHA rule, existing department policy and policies received from other sources. Action research was used to assess current department operations and to create new policy for adoption. The research consisted of literature review, a review of local incident records, a 15- item survey, field

research of task completion time and review of local as well as other department standard operating procedures.

Periodical articles and research paper information were gathered from the National Fire Academy's LRC. Other articles and book excerpts were obtained from information requests to the IAFF, El Paso Fire Department Library, the author's library and documents downloaded from the Internet. Information was also obtained from training videos found in local union archives.

Research Questions

1. What did the OSHA regulation require, directly or by implication?
2. What methods were used by fire departments to satisfy the OSHA regulation?
3. What policies within the El Paso Fire Department can be created, deleted or modified to comply with 29 CFR Respiratory Protection Final Rule?
4. Did performance in El Paso Fire Department allow the OSHA regulation to be met with minimal changes?

BACKGROUND AND SIGNIFICANCE

The City of El Paso is the westernmost metropolitan area in the state of Texas. The western and northern city limits are also the state boundary between Texas and New Mexico. The southern

city limit is the Rio Grande River and the international border between the United States and Mexico. The city's population is estimated at 580,000. The area covered is 280 square miles. There is a mountain ridge running north and south in the middle of the city almost splitting the town in two. Fort Bliss Army Air Defense Center is the city boundary on the northeast side.

El Paso's fire service is a fully paid service. The fire department handles all fire related services in the city, airport fire/rescue crews, hazardous materials emergency response for the entire county and is the first responder for medical assistance calls for the city. EMS is a separate service within the city government.

El Paso Fire Department has 31 pumpers, seven ladder companies, three quints and one squad type vehicle. These fire fighting units are housed in 27 stations. The shape of the city allows for normal backup from three or four directions only in a few areas. There is a mutual aid agreement with Fort Bliss that is rarely used. International and state boundaries do not allow for mutual aid from the south, west or north. A labor contract with Local 51 of the IAFF requires minimum staffing of fire companies with three firefighters. The contract also calls for 25 personnel to be allowed to be on vacation leave on any given shift. When fewer than 25 are off duty on leave the extra relief personnel are utilized as sick leave replacements or as fourth crew members on selected units.

Texas is not one of the "state plan" states effected directly by OSHA regulation. However, when 29 CFR parts 1910 and 1926 Respiratory Protection Final Rule came into effect on January 8, 1998 the local fire administration began to look for methods to meet the regulation. "This is

going to be the new national standard as of April 8, 1998."(Seymor, 1998, p. 9). The rule is also consistent with NFPA 1500 1997 edition, Fire Department Occupational Safety and Health Program 6-4.4, requiring a minimum of four personnel at any incident where a team is operating in the hazardous area of a structure fire. Texas municipal and state agencies are not legally mandated to meet OSHA regulation. Ohio is also not a "state plan" state. The legal opinion of the law department in Toledo, Ohio cites the regulation as evidence of an industry standard and safety precedent usable in civil court proceedings.

Fire administrators in El Paso sought additional personnel for the 1998-1999 budget year to staff all emergency apparatus with a minimum of four firefighters. There was also

A need for some additional new pumper and ladder units to meet state fire commission standards. Personnel were added to staff the new companies but not to upgrade all companies to four personnel. The fire administration then asked for ideas from the district chiefs in the operations division. A long list of suggestions was submitted. Most of the suggestions were from the first thoughts of the chiefs. Little or no research was done on the rule itself or on department performance and existing policy. A safety committee already existed, made up of union and department representatives. The committee was tasked with solving the problem. Members of the committee gathered some of the research material made available to the author.

Executive Development Course

The Executive Development course, held at the NFA as the beginning course in the Executive Fire Officer program, has been the impetus for this research paper. The course was a training ground for the application of applied research as stated in the course overview. It has shown that applied research can offer suggested solutions for existing problems.

LITERATURE REVIEW

The larger portion of the resources involving opinions of experts was obtained from the National Fire Academy Learning Resource Center. Official documents from the Department of Labor and NFPA (National Fire Protection Association) were obtained from the fire department library and a request for information from the IAFF by the local safety committee. Some of the history of the rule was taken from books in the author's library. Information for the final policy suggestions was researched from documents submitted from other departments.

This literature review began with a closer look at the regulatory agency, its history and the history of the rule for Respiratory Protection. This gave a truer perspective to the requirements needed to prepare suggested policy for the El Paso Fire Department.

A Federal Register article on 29 CFR included the text of the rule with historical excerpts. The original Occupational Safety and Health Act was passed into law in 1970. It adopted existing federal standards, and those developed by various organizations like NFPA. The act included a

general duty clause that had been cited in several court cases. OSHA Sec. 5(a)(1) *General Duty Clause*

> Each employer shall furnish to each of his employees employment and a place of employment, which are free from recognized hazards that are causing or are likely to cause death or serous physical harm to his employees.

This clause is mentioned in an IAFF Internet document stating the OSHA Review Commission and court precedent established elements proving violation of the general duty clause. These are:

- The employer failed to make the workplace free of a hazard to which employees of that employer were exposed.
- The hazard was recognized.
- The hazard was causing or was likely to cause death or serious physical harm.
- There was a feasible tool and useful method to correct the hazard.

Thomas Seymor in *A Comprehensive analysis of the OSHA Respiratory Protection Standard, 1998,* described the standard as a replacement for one of the original standards issued in May 1971. The latest rule has fifteen major paragraphs of requirements and four appendices. He related some of the terms in the rule to other OSHA standards. Interior Firefighting is identified as an IDLH atmosphere in OSHA Fire Brigade standards and Hazardous Waste Operations and Emergency Response (HAZWOPER) standards.

Nancy Grant in 1994 explained the relationship between OSHA and state agreements. Under OSHA Part 1901 Procedure for State Agreements the state enters agreement with the Department of Labor, certifying the state will enforce the standard. Should the state standard disagree with the OSHA standard, the OSHA regulation prevails. She also wrote that all states must comply with the HAZWOPER standard requirements for SCBA training, physicals and record keeping due to its inclusion in the Superfund Amendment and Reauthorization Act (SARA). This Act was passed July 1, 1992. It regulated hazardous materials emergency response.

El Paso Fire Department had previously met the standards in the HAZWOPER documents. This provided a base within the SOP designed for hazardous materials incidents that could be expanded to all IDLH situations. The text of the rule itself, with accompanying explanation clarified the exact nature of necessary revisions to department manuals.

Definition of IDLH and Interior Structural Firefighting and the text of paragraphs (g)(3) and (g)(4) of standard 29CFR 1910 were downloaded from the OSHA Internet web site. Immediately dangerous to life or health means an atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere. Interior structural firefighting means the physical activity of fire suppression, rescue or both, inside of buildings or enclosed structures involved in a fire situation beyond the incipient stage. SCBA is an atmosphere supplying respirator for which the breathing air source is designed to be carried by the user.

The text of the regulation subparts causing this research project is as follows:

(g)(3) Procedures for IDLH atmospheres. For all IDLH atmospheres, the employer shall ensure that:

(g)(3)(i) One employee or, when needed, more than one employee is located outside the IDLH atmosphere;

(g)(3)(ii) Visual, voice, or signal line communication is maintained between the employee(s) in the IDLH atmosphere and the employee(s) located outside the IDLH atmosphere,

(g)(3)(iii) The employee(s) located outside the IDLH atmosphere are trained and equipped to provide effective emergency rescue,

(g)(3)(iv) The employer or designee is notified before the employee(s) located outside the IDLH atmosphere enter the IDLH atmosphere to provide emergency rescue,

(g)(3)(v) The employer or designee authorized to do so by the employer, once notified, provides necessary assistance appropriate to the situation;

(g)(3)(vi) Employee(s) located outside the IDLH atmospheres are equipped with:

(g)(3)(vi)(A) Pressure demand or other positive pressure SCBA's, or a pressure demand or other positive pressure supplied-air respirator with auxiliary SCBA, and either

(g)(3)(vi)(B) Appropriate retrieval equipment for removing the employee(s) who enter(s) these hazardous atmospheres where retrieval equipment would contribute to the rescue of the employee(s) and would not increase the overall risk resulting from entry; or

(g)(3)(vi)(C) Equivalent means for rescue where retrieval equipment is not required under paragraph (g)(3)(vi)(B)

(g)(4) Procedures for interior structural firefighting In addition to the requirements set forth under paragraph (g)(3), in interior structural fires, the employer shall ensure that:

(g)(4)(i) At least two employees enter the IDLH atmosphere and remain in visual or voice contact with on another at all times,

(g)(4)(ii) At least two employees are located outside the IDLH atmosphere; and

(g)(4)(iii) All employees engaged in interior structural firefighting use SCBAs.

Note 1 to paragraph (g): One of the two individuals located outside the IDLH atmosphere may be assigned to an additional role, such as incident commander in charge of the emergency or safety officer, so long as this individual is able to perform assistance or rescue activities without jeopardizing the safety or health of any firefighter working at the incident.

Note 2 to paragraph (g): Nothing in this section is meant to preclude firefighters from performing emergency rescue activities before and entire team has assembled.

(OSHA, 1998, pp. 14,15)

The text of the regulation without further interpretation raised many questions in the fire service community. A document, *2In/2Out Questions and Answers* compiled jointly by the IAFF and the IAFC attempted to clarify what they felt were twenty outstanding questions. Some of the answers were pertinent to this research.

Radio contact is sufficient means of communication between the interior team and the exterior team, but is not sufficient between members of the interior team. The 2In/2Out rule is considered the minimum acceptable standard for safe fire ground operations for all firefighters when SCBA is used. OSHA defines incipient stage fire as fire which is in the initial or beginning stage and which can be controlled or extinguished by portable fire extinguishers, class II standpipe or small hose systems without the need for protective clothing or breathing apparatus. In high rise situations the "outside" team should be located on the floor below the IDLH atmosphere or lower if that floor is not safe.

Further answers offered insight regarding personnel duties. At least one member of the outside team is to account for the interior team at all times and have no other duty. The other member's assigned task must qualify as expendable, without risk to other employees on the scene. The rule does not require a two-person team outside the atmosphere for every team operating inside. Additional outside crews are to be assembled if the emergency escalates beyond the point at which accountability can be maintained from a single exposure or rapid rescue cannot be achieved. Deviation from the rule is acceptable when a known life hazard exists. The deviation is considered an exception and must be fully documented as such. The mandated notification of the department must be done any time an exception is made. The employer must be informed before rescue by outside personnel. This allows the employer to provide appropriate assistance.

Collin Campbell in1998 compared 29 CFR to NFPA 1500. The federal regulation covers the same subject. 2In/2Out was originally proposed as an interim amendment to standard 1500 and was incorporated into the 1997 edition. NFPA 1404 Fire Department Self Contained Breathing

Apparatus Program paragraph 3-1.6 indicates that members wearing SCBA are to operate in teams of two or more and must be able to communicate through visual, audible, physical, safety guide rope, electronic or other means to coordinate their activities and are to remain in close proximity to each other to provide emergency assistance.

Firefighter safety is the driving force behind the respiratory protection rule. The solution to the problem this research is to solve should include more than merely the words to satisfy a standard. Further reading of articles and standards reinforced this concept.

The Federal Register, on January 8,1998 gave a summary of the IAFC position on firefighter safety. The firefighter is usually in hostile environments where normal systems for safety have already failed. The work site is always new and unknown. They do not report to a fixed location or work in a familiar environment. They accept a level of personal risk unacceptable to workers in other occupations. Tenants and others in the process of being rescued have been known to panic and attack firefighters to obtain air from the firefighter's respirator in an attempt to save their own lives.

In testimony on H.R. 1783 before the subcommittee on Economic and Educational Opportunities, House of Representatives, 104th Congress (July 11, 1995, chairman: Cass Ballenger) Harold Schaitberger stated, "The 2In/2Out rule has been the industry standard in the fire service for over 25 years. It is also based on common sense. If there are two firefighters

inside a burning building when a roof caves in, at least two firefighters are required to assist and/or rescue them.

The Fire Chiefs Handbook 5th edition contains statistics from a 1993 NFPA survey.

Fifty four percent of career firefighter deaths occur on the fire ground. Operations are more hazardous in dwellings and apartments with 58.3% of career fireground deaths.

Factors contributing to safety at emergency scenes include incident management, accountability, rapid intervention crews, use of a safety officer, risk management etc..

(Soros 1998 p.1) outlined the Fire Department Safety Officers Association's (FDSOA) position on "Two In and Two Out". The unanimous opinion of the Board of Directors was to support the new rule. Communities need to realize the work firefighters do. The work is largely unknown to the public and the fire service never says no. The key to reducing firefighter injuries is adequate manpower at a fire. In court, precedent can be established that lack of manpower caused or was likely to cause death or serious physical harm. There are feasible and useful methods to correct the situation. Six controlling factors were cited in making the decision to support the rule.

1. Most fire service work environments are considered IDLH.
2. The fire service responds to hazardous material incidents.
3. Where SCBA is required so is the buddy system.

4. NFPA 1500 states four members shall be assembled before starting an interior attack.

5. NFPA 600 mirrors NFPA 1500.

6. Formal interpretation from NFPA recommends minimum staffing level on the fire ground as four persons.

A summarization of a positive attitude toward the issue found the following.

Complying is not as complicated or difficult as some would have us believe.

It does not stop us from trying to save lives if short-handed. No building is worth a firefighter's life. The rule stops interior attack if rescue is not an issue and minimum personnel are not on the scene. Debate over cost versus firefighter safety will continue despite the OSHA rule. If we believe interior attack is necessary we will take the actions needed to deliver four firefighters to structure fires in time to make a difference, hire or add staff, cross train administration personnel and EMS providers and whatever it takes.

Obtaining resources should not be such a hard sell. If we are to stop fires from consuming the fabric of people's lives - photographs, family bibles, heirlooms, businesses and jobs we have to go inside, and that requires placement of four firefighters on the fire ground in a timely manner. (Marentette, 1998, p. 36)

Marentette goes further to list activities the firefighters on the scene before the arrival of four personnel can accomplish. These include, but are not limited to, utility control, size-up of the

entire building, locate safe entry points, obtain water supply and lay and charge initial attack lines.

A number of chief officers responded to a fax survey from Fire Chief Magazine. Replies were included in the September, 1998 issue. Chief Steve Moody, Salina, Kansas "Departments have the option of waiting for the arrival of additional personnel. It's about time we put safety ahead of Bravado. 2In/2Out mandates strict accountability." Chief Jim Myklestad, Mason City, Iowa offered, "After all, we are a business and our product is safety." Opposition to the new rule mentioned declining resources and a feeling, that this is another unfunded federal mandate.

Despite arguments to the contrary, the rule needed incorporation into local fire department policy due to a potential for litigation. Additional policy was necessary to insure the safety of firefighters responding to IDLH atmospheres.

PROCEDURES

A 16-item survey (Appendix B) was constructed to gather information about measures taken by other fire departments across the nation for handling the 2In/2Out rule. The survey was sent to 90 fire service officials across the United States. The survey was mailed with a self addressed stamped envelope and a letter (Appendix A) explaining its purpose. The survey was not intended to be a scientific sampling. The mailing list was composed entirely of students in the Executive

Fire Officer Program at the NFA. This list proved to be a limiting factor in itself. Fire department size and geographic representation were not sampled very well due to the mailing list. The survey text had several limitations and errors. A few of the survey questions did not generate the answers sought. Information about OSHA obligations was not significant due to a misunderstanding by the author. This caused the wrong questions to be asked. Another limitation was that the survey was not tested by having other fire service personnel answer the questions before actually using it. Errors in the survey questions could have been identified and changed had the testing occurred. No manipulation of the sample occurred. The intent was to gather ideas for methods and policy creation, not to produce statistical information. Therefore, all sizes and types of fire service entities received the survey.

A self addressed stamped envelope and instructions for faxing replies accompanied the survey. Sixty-two replies were received, a 68.8% return rate. Additionally, a request for a copy of local policy, if available, was included in one of the questions. Twenty-one examples of policy intended to meet the requirements of 29 CFR were received. The survey and the letter enclosed with it can be found in Appendix ? and ?. The replies received were placed in a database where 15 of the 15 items were entered.

A review of El Paso Fire Department manuals was done to look for policies that would contribute to new policy constructed to meet 29 CFR. Several parts of the manuals

did have elements that could be incorporated into the new policy this research is intended to create. The identified policy would have to be modified and more would have to be written to meet the regulation. The outcome is found in the results section of this document.

A search was performed in the Texas Fire Incident Reporting System (TEXFIRS) of the El Paso Fire Department. The information sought was the time differential between arrival of the first and second fire unit at all incidents with probable IDLH atmosphere. The included codes were:

11. Structure Fire, included are any fires inside a building or structure, whether or not there was a structural damage to the building.

17. Outside spill, leak with ensuing fire.

19. Fire, explosion not classified

47. Chemical emergency, included are chemical spills and radiation leaks.

The recorded times were accessed by entering a request for a monthly incident report for each of five district chief units for a six month period beginning with January 1998. District chief units were chosen because they are dispatched on all incidents of the types listed. The reports were sorted, and the incident types identified by reading and highlighting the selected codes. Each incident was then accessed in the municipal computer to derive the first arriving company's arrival time and the second arriving company's arrival time.

The data gathered was evaluated to assess how much time elapsed between the arrival of the two units. The outcome was divided into one-minute differentials and calculated to produce the percentage of incidents where the arrival time equaled each one-minute category. The time was not evaluated to the nearest second. This was performed to compare the information to timed evolutions in order to find out if a group of four firefighters would be on the scene by the time a safe interior operation could be attempted.

The second part of the information regarding arrival times and task completion was accomplished through field research. Six fire companies were selected to perform the same task in timed exercises. These included two of the most common pumper used on the department, two quints and two other types of pumper. The differences in the apparatus were not intended to measure the truck type, but rather the hose configurations.

The evolution performed was a simple lay of a supply line from a hydrant followed by stretching a charged hand line. The supply line was 500 feet long. The distance identified, by city ordinance, for over 90% of the structures inside the city limits. The hand line was 150 feet long. This was considered the length used for a majority of building fires. All evolutions were timed from a signal to begin given while the apparatus was parked next to the water hydrant. The personnel were dressed in turnout clothing as they would be had they responded from the station. The individual stretching the hand line was required to be equipped with full protective gear,

including SCBA. The time ended when the water reached the nozzle, evidenced by a visible fire stream.

The purpose for the parameters set for the exercise was to create a situation similar to actual response to a structure fire or other IDLH atmosphere creating incidents. Company officers were given complete freedom to choose what type of hand line to use. The supply hose was laid from a hydrant on a straight street with no corners or curves. Complete PPE was required to simulate actual working conditions. A set of completion times was compiled from the exercises.

The literature review was an excellent source for material. The National Fire Academy Learning Resource Center provided most of the current output from the fire service writers. Internet documents provided the actual wording of the regulation and interpretation. A packet of information from the IAFF contained NFPA 1500, questions and answers about the regulation and a generic standard operating procedure.

RESULTS

1. What did the OSHA regulation require, directly or by implication?

The answer to this question came from the text of the rule and from several interpretations offered by the IAFF, the IAFC and several articles found in the literature review. The initial information is from the Federal Register publication of the rule.

This requirement information is entirely in reference to paragraphs (g)(3) and (g)(4) in Federal OSHA 29 CFR Respiratory Protection final rule. Other regulations or standards were included due to reference in 29 CFR to clarify the meaning of phrases or terms. Interpretations are from the authors of other documents referring to the rule that is the focus of this research.

Paragraph (g)(3) deals with and is titled *Procedures for IDLH Atmospheres.*

The employer is tasked with ensuring one or more employees are located outside the IDLH atmosphere. Visual, voice or signal line communication is maintained between employees inside the IDLH atmosphere and those outside the atmosphere. Employees outside the atmosphere must be trained and equipped to provide emergency rescue.

The employer must be notified before outside employees enter the danger zone to provide rescue. Appropriate assistance necessary to effect the rescue must be provided once the employer is notified. Employees outside the IDLH atmosphere must be equipped with positive pressure SCBA or the equivalent and appropriate equipment to retrieve the employees who entered the atmosphere. Paragraph (g)(4) contains additional requirements for interior structural firefighting.

Paragraph (g)(4) is titled “Procedures for interior structural firefighting”.

The employer is to ensure, in addition to the requirements found in (g)(3), that at least two employees enter the IDLH atmosphere and remain in visual or voice contact at all times. All

employees involved in interior structural firefighting must use SCBAs. There are two notes to paragraph (g)(4). The first note allows one of the two individuals outside the IDLH atmosphere to be assigned to other tasks, like incident commander or safety officer. This individual is required to be able to perform rescue without compromising the safety of any firefighter at the incident. The second note says, “Nothing in this section is meant to preclude firefighters from performing emergency rescue activities before an entire team has assembled.” The regulation has generated questions from several sectors of the fire service.

The IAFF requested an official interpretation of the regulation by Federal OSHA. The request was answered by Mr. John B. Miles, Jr. Director, Directorate of Compliance Programs on August 15,1994. The interpretation is summarized here. Fire fighters using SCBA must be in a buddy system of two or more persons. Electronic communication shall not be substituted for direct visual, voice or tether line between members of a “buddy” team in the danger area. The outside team must be in place and equipped identically to the interior team before entry into a hazard area.

A minimum of four individuals, two inside and two outside, is required before entry at operations with IDLH atmosphere. One of the two persons outside the hazard area is allowed to be involved in other activities. OSHA also said the assignment of operators of heavy equipment as standby could jeopardize safety and health of workers. The rescue team must

maintain the buddy system should they be deployed for rescue. The exterior team must be equipped and trained adequately to perform rescue if needed.

OSHA identifies interior structural fires as IDLH atmospheres when they are beyond the incipient stage. Incipient stage is defined in 29 CFR 1910.155(c)(26). Any fire that cannot be controlled or extinguished by portable fire extinguishers, Class II standpipe or small hose systems without the need for protective clothing or breathing apparatus is considered to be IDLH. The "two in/two out" requirement does not take effect until interior operations begin. During the incipient stage, an investigation can be performed to determine the progression of the fire. This investigation does not require a two-person team.

In testimony before Congress Harold Schaitberger indicated that OSHA's requirement does not intend to establish minimum staffing of a fire truck or fire company size. It seeks only to stipulate the number of firefighters present before an interior fire attack is initiated.

2. What methods were used by fire departments to satisfy the OSHA regulation?

The answers to this question were sought by sending a 15-question survey to 90 fire officials across the nation. Sixty-two surveys were returned 68.8% of the sample group. A variety of fire departments answered the questions. Twenty-one copies of procedures were sent back in response to the last questions in the survey. The procedures varied from a single page to full sections of operation procedures with sixteen pages of text.

Table 1

Department Type and Region by Population Served

Population Served	Total	Paid	Combination	Volunteer	NE	NC	S	W
Under 25,000	15	6	7	1	3	2	3	6
25,000 to 99,000	27	15	9	1		8	7	12
100,000 to 249,000	10	10			1		6	3
250,000 to 499,000	3	2	1			1	1	1
Over 500,000	7	4	3				4	3
Totals	62	37	20	2	4	11	21	26

As can be seen in the data totals 78% of the group responded to the survey from the south and west. A majority, 60%, of the information came from fully paid departments. Sixteen out of 62 respondents served populations over 100,000. Question 1.C. in the survey gave no significant trends as the variety of responses seemed unrelated except that most departments serve more than one type response area. The information gathered from the 62 departments responding to the survey indicated a wide range of sizes and activity.

The responses listed in table 2 include departments with as few as six members and as many as 1500 members. The geographic responsibility ranges between one and three tenths of a mile and 27000 square miles. Total work load varied from 20 responses in a year to 177,000 in year.

Structure fire experience listed a low of two and a high of 4,300 responses. There were those questions that did not receive answers for any number of reasons. The different types and sizes

of department allowed excellent input on solutions for complying with the Respiratory Protection rule.

Table 2

Survey Response Information on Department Size, Response Patterns and Response Area

	Total Staff	Total Square	Total Responses	Structure Fires		Total Staff	Total Square	Total Responses	Structure Fires
Respondant		**Miles**			**Respondant**		**Miles**		
1	103	85	46,000	1,200	32	36	15	3,100	170
2	?	85	3,500	25	33	120	na	1,700	4
3	156	902	4,884	149	34	60	26	850	5
4	75	18	5,221	112	35	90	unk	20	0
5	400	1600	24,862	2,500	36	84	110	2,900	38
6	6	360	1,323	200	37	24	6	3,000	
7	13	8	4,200	42	38	45	205	1,942	60
8	270	1200	1,500	100	39	51	14	4,000	52
9	14	12	515	6	40	49	na	2,849	50
10	12	7.5	880	100	41	782	511	70,000	822
11	71	90	5,500	800	42	482	197	53,000	70
12	78	17	5,200	30	43		12	1,466	9
13	69	49	5,290	104	44	70	4.5	5,400	160
14	35	75	716	5	45		37	402	4
15	374	354	20,000	1,500	46	75	36	5,182	50
16	23	900	6,000	28	47	123	27.2	10,577	610
17	138	37	17,000	200	48	117	45	18,604	3
18	225	30	30,000	2,000	49	1200	500	117,000	350
19	54	14.7	3,800	30	50	611	650	177,000	4,300
20	120	15	6,000	85	51	1056	600	22,000	2,500
21	50	9	1,400	?	52	65	110	800	95
22	87	25	7,000	60	53	30	1.3	1,000	16
23	70	27000	500	2	54	72	187	861	100
24	117	50	7,000	300	55	132	90	20,000	100
25	42	8.2	4,500	4	56	50	180	1,100	20
26	30	58	850	35	57	270	11.7	7,300	450
27	93	65	5,263	100	58	950	1000	86,000	1,500
28	68	na	3,800	95	59	34	12	1,790	74
29	unk	19	4,300	110	60	66	23	5,491	300
30	36	12.5	400	4	61	325	90	48,000	2,000
31	na	30	13,500	2,300	62	1500		150,000	

The next section of the survey asked about the number of units dispatched to structure fires. It was followed by a request for information on company staffing. The returned information was useful. However, there were factors that made a true sample unworkable. The question asked for the number of units dispatched to a structure fire. Many departments have multiple levels of response depending on the nature of the structure and the occupancy. The next portion of the survey asked for the crew size on companies in the responding department. Again, the variety of companies made the data only marginally helpful. The question did not differentiate between each type of unit. Table 3 will list only four unit categories. The category "Other" includes all units other than engine, truck or battalion. The table serves as an indicator of company staffing across the country with no other qualifier.

Table 3

Number of Companies Dispatched to Structural Fires and Number of Company Personnel

	1	2	3	4	5	6	7	8	9	10	NA
Units Dispatched	**0**	**1**	**8**	**10**	**20**	**11**	**7**	**3**	**0**	**1**	**1**
Engine	**0**	**4**	**21**	**25**	**4**	**3**	**1**	**0**	**0**	**0**	**3**
Truck	**0**	**5**	**12**	**13**	**3**	**2**	**0**	**0**	**0**	**0**	**27**
Battalion	**13**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**48**
Other	**0**	**23**	**12**	**1**	**2**	**1**	**0**	**0**	**0**	**0**	**23**

Where answers were multiple numbers like three or four the highest of the numbers was chosen. One department listed the staffing of an engine as three plus volunteers. This accounts for the missing answer in the engine row. Forty-six departments staffed engine companies with either three or four personnel. Truck companies faired similarly. Twenty-seven departments did not list a company strength on trucks while 24 answered either three or four. Staffing for these units appears to be three or four for a large majority nationwide. The number of units dispatched to structure fires is heavily weighted in the three to six range with 49 departments falling in this group. It must be considered that responses changed depending on the occupancy. Commercial structures warranted one or two more apparatus per incident.

Questions seven and eight included the request for copies of procedures utilized by the respondent. These will be dealt with here in narrative form with exception for counting those

with no response, no changes due to the rule and those with solutions in progress.

There were several surveys returned with little information given for these two questions.

Seven responses had no answer for changes made to meet the regulation. Ten departments replied that they had changes pending or indicated unfinished policies. No changes are planned in twelve of the departments sending back answers. Twenty-one departments returned copies of

standard operating procedures. They are reviewed here in conjunction with the standard in the packet received from the IAFF.

The number of fire departments utilizing the methods dealt with in this section need to be compared to the 21 operating standards received and not to the full 62 surveys received. Items are discussed with similar items in an order relating to OSHA 29 CFR 1910.

Three standards included a declaration of either a working fire or an IDLH atmosphere to other fire units. Several had notification of formation of the rapid intervention team mentioned. Official declaration of the possibly dangerous IDLH could aid preparation for intervention teams.

Seventeen out of 21 procedures included rapid intervention personnel located outside the IDLH atmosphere. These teams are termed rapid intervention teams, rapid intervention crews and rapid intervention groups. Eighteen departments specify the wearing of complete personal protective equipment including SCBA by the outside team. The number of crew members on the intervention team is usually set at a minimum of two members. Fifteen policies included a specific number of personnel on the intervention crew. Nine lists of equipment for rescue kits on standby were found among the rules submitted.

Employer notification upon initiation of rescue was not specific in most policies. However, may day protocols were present in nine procedures and eleven requirements for personal accountability roll calls upon activation of the rapid intervention crew. The location of the RIT was flexible in most documents. Six of the returned policies staged the RIT at the command post.

The roles assigned to the outside crew were defined in 12 documents. The Incident Commander, pump operators and in a few cases the Safety Officer were not permitted to be part of the outside crew. A third of the departments required replacement of the RIT when it was deployed. Special radio channels for intervention teams were not common.

Interior crews must remain in visual, voice or tether line communication. Buddy system use for all operations inside IDLH atmospheres was included in 15 regulations. Regular benchmarks including status reports were rare, but could be an important part of accountability.

Exceptions to the “2In/2Out” rule appeared in 14 documents. One or two mentioned the exception allowing investigation of the fire during the incipient stage. When exception is made due to immediate life hazard employer notification was important. The employer is tasked with providing any necessary assistance. Documentation of exceptions, as required by OSHA, was mentioned in only seven standards.

Several protocols included other methods for dealing with the new regulation and firefighter safety. These are worth mentioning as they may add valuable text to a final suggestion. The combination and volunteer agencies added automatic dispatch of an additional engine to IDLH atmosphere incidents. Several tasks were identified for completion before the arrival of enough people to initiate "2In/2Out". Deployment of the RIT generated a special report in one department. The danger area had several identification methods.

Identification lists of possible IDLH environments existed in a few regulations. Hot zone identification is a useful tool. Advanced Life Support is required on the scene in several jurisdictions. One document included instruction on appropriate actions to be taken by the injured or trapped firefighter. These methods and others can make a valuable contribution to a suggested Standard Operating Procedure (SOP) for El Paso Fire Department. Combination of the policies and procedures found in the documents from fire departments around the nation with existing mandates in El Paso can produce a safe and useful policy.

1. **What policies within the El Paso Fire Department can be created, deleted or modified to comply with 29 CFR Respiratory Protection Final Rule.**

As mentioned in the beginning of this document, the staffing levels in El Paso do not normally allow the first company to accomplish tasks requiring four personnel. Little or no mutual aid is available. The local EMS crews are not trained in structural firefighting and therefore cannot be used as the outside two-person team.

A review of existing El Paso Fire Department manuals was accomplished. The review was intended to locate policy already in force that are adaptable to the 2In/2Out rule. Several sections of the manuals included regulations amenable to this purpose. Most of these were created as a result of the HAZWOPER regulations for hazardous materials incidents. They were found in the department Operational Procedures Manual.

Section 6 of the Operational Procedures Manual is titled “Rapid Intervention Crews”. The purpose of these crews, subsection 01, is the rescue of members who become injured, trapped or lost. The team concept is explained. Those operating in nonspecific hazardous areas should operate in teams of two with a radio. A single member shall remain outside the hazard area during the initial stages of an incident when one company is at the scene. Communication with operating team is to be maintained.

The standby member is allowed to perform other duties. They must wear Personal Protective Equipment (PPE) and have SCBA available. Rescue of operating team by standby member is permitted. The need for rescue is to be communicated to dispatch prior to entry. The next due company or alarm will be dispatched when a missing or trapped member is reported.

Rapid intervention crews (RIC) are required when a second company begins operations in the hazard area. At this point the incident is no longer considered in the initial stage. The RIC consists of at least two members fully equipped with PPE, SCBA and any specialized rescue

equipment. In the early stages of an incident RIC can be either a dedicated RIC or members performing other duty but ready to deploy. As the incident escalates they must be dedicated members or a dedicated full crew in the staging area or on the scene.

The RIC in this section can be modified to satisfy the requirement for two outside personnel at an incident with an IDLH environment. Structural fires need to be specifically addressed in the text. Initial stages needs to be redefined, as does standby member.

Section seven of the Operational Procedures manual deals with accountability. Personal accountability name tags and a system of passport cards, helmet tags and status boards is described. The system is a good one and should remain in the manual. It does not directly address the 2In/2Out issue but can be used immediately to account for inside and outside personnel. It is currently only required at more complex incidents. A hazard zone is referred to for purposes of collecting crew passports. The hazard zone is not specifically identified. The collecting and responsibility for the passports is well described.

Twenty minute benchmarks are issued beginning with the arrival of the first company. Personal Accountability Roll Calls (PAR) are to be initiated upon report of missing or trapped firefighters and any other sudden hazardous event. This is not an evacuation. Minimum crew size is two with a portable radio.

Hazardous Materials Task Force operations has entry team operations that are compatable with the OSHA rule. The entry team is made of two members. They must be in visual contact with each other at all times. One of the members must be in contact with members outside the hot zone at all times. A back up team with protective equipment equal to the entry personnel must

monitor the radio. An Emergency Medical Service (EMS) unit with Advanced Life Support (ALS) capability is to stand by to provide assistance and transport.

The RIC section of the manual can be changed to achieve the objective of this research. Portions of the hazardous materials operation should be included in the new section. an adaptation of the accountability system in the rapid intervention section would be a desirable addition. The proposed changes can comply with the written part of 29 CFR. Information about exceptions and documentation are necessary. The definition of IDLH atmosphere and incipient stage fire would be included.

4. Did performance in El Paso Fire Department allow the OSHA regulation to be met with minimal changes?

Two procedures were used to answer the question of performance on the El Paso Fire Department. The first was a review of incident records to determine the time differential between the first arriving company and the second arriving company at incidents with IDLH environments. The second procedure was timed evolutions. The evolution duration was

compared to arrival times to ascertain if a second company would normally arrive before safe interior operations could begin.

Incident records from computer stored data in TEXFIRS (Texas Fire Incident Reporting System) were reviewed for a six month period. The time period examined was from January 1, 1998 to June 30,1998. Monthly reports for all incidents responded to by District Chief units were printed for further evaluation. All responses identified by codes relating to probable IDLH environments were highlighted to enable the arrival times to be researched. Each individual incident was recalled and the first company on the scene time and the second company on the scene time was recorded on the printed reports.

The four types of incident researched were codes 11, 17. 19 and 47. Code 11 is a structure fire. Included are fires inside a building whether or not the structure is involved. Code 17 is an outdoor spill or leak with associated fire. Code 19 is an explosion and fire not otherwise classified. Code 47 is used for chemical emergencies to include chemical spills and radiation leaks. 218 incidents were found to meet the criteria within the six-month period.

The time differential was processed in one-minute intervals. The percentage of the whole amount constituted by incidents represented by each interval was calculated for later comparison.

The District Chief units respond on all multiple company dispatches. All of the codes of interest are multiple company responses. For this reason they were chosen for research units. No

significant disparity was found to exist between the chief units to indicate any geographic differences.

The result of the data review is as follows. Fire companies arrived at the same time or had less than one minute between the first and second unit thirty percent of the time. Arrival in less than two minutes was achieved on 68% of the calls. Less than three minutes difference in time existed on as much as 87% of the incidents. Between three and four minutes was the finding for 93% of all incidents. There remained the task of finding out how long basic fire department tasks take.

Six apparatus and crews were timed with a stop-watch to obtain the time interval for basic a hose evolution. The crews were to simulate arrival at the scene of a structure fire. Upon turning the corner where a water hydrant was located the starting time was established. A hand signal was given to signify time zero. The company then laid a 500 foot supply line from the fire hydrant. The course was on flat ground and in a straight line.

The supply hose was then connected to the pump inlet. A 150-foot hand line was to be stretched out in a straight line at a 90-degree angle from the apparatus. The nozzle operator, in full protective clothing and wearing SCBA, had to demonstrate the hand line to be operational by opening the nozzle and eliciting a short burst of water. The time for the simulation ended when the water was produced.

Two time periods were measured for each company. The first was the time taken to lay the supply line. This ended when the truck came to a halt at the pseudo fire ground. The second included the first time and stopped at the end of the simulation. Table 5 illustrates the outcome.

Table 4

Timed Evolution Outcomes by Company

Company	Supply Time	Total Time
P16	:53	3:21
Q16	1:16	2:59
P23	:55	2:43
P21	46:30	3:53
P30	1:00	3:41
Q28	1:00	3:49

A safe entry into an interior structure fire is accomplished with a charged hose line. This simulation mimics the action that should occur before entry into the IDLH atmosphere. As illustrated in table five, in 87 to 93 percent of incidents a second unit is on the scene by the time interior teams are ready to proceed. If the task accomplishment time is shorter due to proximity of a water hydrant or other reasons the first arriving unit can accomplish any of several fireground tasks until arrival of the second unit.

DISCUSSION

Comparison Between the Study Results and Findings of Others

Marentette noted in 1998, “2In/2Out” is opportunity rather than burden. Complying is not as difficult as some would have us believe. The “2In/2Out” rule is obviously a safer method for initiating interior fire attacks. The same method should be utilized for all potential IDLH

environments. “We have heard this before-hazardous materials protocol and rules.” (McGill, 1998, p.3)

The safety of personnel is the responsibility of the fire service. The tendency to rush into situations without assessing risk potential should be changed. “It’s about time we put safety head of bravado.” (Baltic, 1998, p.44) The fire service has failed in the mission of personnel safety. This is proven time and time again in death and injury statistics from NFPA and IAFF. Fire departments can operate in compliance with 29 CFR. It has been done for years in hazardous materials operations. A structural fire is indeed a hazardous materials operation.

El Paso Fire Department has operated at hazardous materials incidents with at least two persons on the entry team for several years. The entry team is backed up by an identical team outside the hot zone. The outside team has been required to be equipped with identical protective clothing to those entering the zone. All members of both teams are required to wear SCBA. The visual and voice communication requirement in 29 CFR is strictly observed during hazardous materials operations.

Manning,1998 indicated that he felt many departments would be unable to initiate immediate attack upon arrival. The use of the word immediate may indeed make this statement true. The tasks a first arriving engine can perform preparing for an interior fire attack are numerous. A few of these tasks, a charged hose line, water supply provision, assess the scene and the fire, can and

should be done to ensure a safe operation. The local El Paso time differential between the arrival of first and second arriving units shows that a second unit can be used effectively as the two out personnel without undue delay. The accomplishment of the most basic tactical maneuvers by the first unit makes the second unit's arrival occur at just the right moment for fire attack.

The changes necessary to comply with 29 CFR can be made. Marentette (1998) pointed out, "If we believe interior attack is necessary we will take the actions needed to deliver four firefighters to structure fires in time to make a difference." Written operating procedures need creation or revision. Tactical operations can be changed and the training to do so is not extensive.

Author's Interpretation of the Study Results

The research accomplished for this project allowed the author to take an in depth look at the "2In/2Out" regulation. The literature review included a close examination of the text of the rule, interpretations of the rule by the IAFF and the IAFC, NFPA 1500 and explanations found in the Federal Register. The insight gained from these documents was a necessity for creating suggestions for new policy. Other information found in periodical articles pointed toward the

spirit of the rule and provided historical information that further clarified the meaning of compliance with the respiratory protection rule.

The OSHA regulation requires properly equipped teams of two for operations inside an IDLH environment. It also requires a minimum of two rescue personnel outside the atmosphere to be on vigilant standby with proper equipment for rescue. Additional portions of the regulation and much of the explanatory text serve to build upon or define parameters for the basic concept. OSHA did not intend to set minimum staffing of fire companies. The situation found in individual communities may cause a need for increased staffing. The local fire service entity still decides what methods will be used to meet fire attack criteria.

The methods found in policies from across the country varied. One of the important considerations was the economic impact of additional personnel for departments with less than four persons per fire unit. Additional units were dispatched on structural fires to add personnel without hiring paid staff. These units came from within the department, from mutual aid and from other services like EMS. Other departments added personnel to selected companies and not to all companies. Properly done this tactic was found to be very effective. Selection criteria for the units to gain personnel included the type of unit, geographic considerations, type of area served and single bay stations. The policies returned with the survey contained many possible scenarios.

The SOP's received had a variety of solutions. Most of the standards contained the exact wording of parts of 29 CFR. Some of them had instruction for every tactical action by every unit dispatched to an emergency. One of the most popular tools for satisfying the two outside rescuer part of the rule was the rapid intervention team. These teams were well defined in the procedures and had well defined duties to perform at incidents. Equipment lists for rescue kits to be in the

possession of intervention teams were found in a few documents. Accountability systems, notification requirements for several contingencies, may day announcements and instruction for action by the firefighter in need of rescue. This portion of the research had a large impact on the results of the project.

Many of the tools included in returned surveys can be adapted to the local procedure in El Paso.

Adding units to standard dispatch for some incidents and geographic areas would assist practical application of "2In/2Out". Definition of terms for concepts like IDLH and incipient stage fire will clarify the meaning of the suggested procedure. A few documents identified the roles for assignment to the outside crew at structure fires. Several different ideas offered for the roles that could be utilized in the El Paso manual. There were more similarities in operations around the country to the local situation than there were disparities.

The performance of fire companies in El Paso was close to meeting the OSHA regulation. The author had observed on several occasions that evolutions performed by the first company at a fire scene were still in progress when the second company arrived. This theory held true when

compared to incidents in all areas of the city for a six-month period. The time spent by each unit to complete the field exercise supported the observation. The field exercise gave only a very rough idea of how long fire crews take to complete tasks. There are too many variables to measure for a complete picture of task duration in all fire situations.

Organizational Implications

El Paso Fire Department has operated at hazardous materials incidents with at least two persons on the entry team for several years. The entry team is backed up by an identical team outside the hot zone. The outside team has been required to be equipped with identical protective clothing to those entering the zone. All members of both teams are required to wear SCBA. The visual and voice communication requirement in 29 CFR is strictly observed during hazardous materials operations. EMS is required to be on standby at all hazardous material emergencies. An expansion of parts of the hazardous materials operational procedure will satisfy most of the "2In/2Out" regulation.

El Paso Fire Department does have four persons at the scene of over eighty percent of IDLH atmosphere generating incidents by the time safe interior operation can begin. Most of the policies necessary to comply with the OSHA rule are in the department manuals in an outdated form. An expanded rapid intervention crew procedure needs to be created. Basic methods of operation do not need to be changed. Terminology definitions need to be in line with current regulation. Creation of additional staff positions staff four person companies should be started in

carefully selected areas. The eighty percent coverage mentioned still leaves nearly twenty percent of the incidents that do not have four firefighters on scene in a timely manner.

RECOMMENDATIONS

A suggested operational procedure (Appendix C) is attached to this document. The procedure is formatted in the form used in local department manuals. This procedure will satisfy the requirement for 29 CFR. It was compiled from submissions of standards from fire departments across the nation, the OSHA rule and a literature review. Safety policies have been added that do not have direct application to the OSHA rule but efficiently increase firefighter safety. Many of the respondents to the survey indicated they had initiated training sessions to supplement changes in their SOP. This is the next logical step to take after the manual revision.

The training sessions should be used as an opportunity to disseminate additional information. Rapid intervention crew training and trapped firefighter training are suggested supplements to the procedure change classes. All members are issued personal alarms and hand radios are available for each member on the apparatus. A review of the emergency features associated with these personal safety devices can be incorporated in training.

The review of incident arrival times completed for this project was intended to show a trend and not more. A more comprehensive review would indicate exactly where in the city the longer arrival times are occurring. The project review did not examine the arrival times for the first unit

on the scene. This information is periodically compiled for justification of new station or company placement. Arrival time examination extended to both the first and second company at the scene of structure fires could justify increasing the minimum staffing on selected companies.

It could also assist with choosing the selected companies. Two or three of the surveys indicated the use of extra permanent assigned personnel on certain types of fire company. One department

assigned four persons to engines in single bay stations for the purpose of meeting the OSHA rule discussed in this paper.

The manual revision suggests several changes to current practice. These would need to be instituted as a package. Identification of probable IDLH atmosphere must be followed by a radio transmission to that effect. Exceptions to the "2In/2Out" rule must also be transmitted and documented. Defined roles for outside team members are necessary. Clear definition of terms

related to IDLH operation must be included in the manual or supplemental documents. Adoption of this suggested procedure or specific parts of it is necessary to avoid possible future litigation in cases of firefighter death or injury. It is also necessary for increasing the safety of personnel on the department.

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APPENDIX A

LETTER TO ACCOMPANY SURVEY

Dear Chief:

The El Paso Fire Department is in the process of examining our procedures and policies to comply with OSHA 29 CFR paragraphs (g)(3) and (g)(4). As part of a research project I am conducting in conjunction with the Executive Leadership course at the National Fire Academy, please find enclosed a survey titled "OSHA 29 CFR " 2 in 2 out".

I would ask that you or someone that you designate, complete this survey, and return it to me at your earliest convenience in the pre-addressed, stamped envelope provided or fax it to my fax line at 915-759-8259. No department will be identified in any manner. The information will be combined with information from across the nation to complete the research and assist the department in preparing to meet the regulation. It should be noted here that we are not in an OSHA state. Therefore we were not obligated to meet the October deadline most of the rest of the nation had.

Thank you, in advance, for the time and assistance given to complete this project. Requests for copies of the compiled information should accompany the completed survey with mailing instructions or Email address. Note: The survey can be emailed to me at Wwarling@aol.com with the subject line titled, NFA survey.

Sincerely yours,

Wade A. Warling

District Chief

APPENDIX B

OSHA 29 CFR Compliance "2 in 2 out" Survey

1. Please answer the following questions about your fire department

A. Population served
- Under 25,000 _____
- 25,000 – 99,000 _____
- 100,000 – 249,000 _____
- 250,000 – 499,000 _____
- Over 500,000 _____

B. Department Type:
- Fully Paid _____
- Combination _____
- Fully Volunteer _____

C. Response area includes:
- Rural _____
- Suburban _____
- Urban _____

D. Total fire company staffing_____

E. Total square miles protected _____

2. Geographic Location:

_____ Northeast CT, ME, MA, NH, NJ, NY, PA, RI, VT.

_____ North Central IL, IN, IA, KS, MI, MN, MO, NE, ND, OH, SD, WI.

_____ South AL, AR, DE, DC, FL, GA, KY, LA, MD, MS, NC, OK, SC, TN TX, VA, WV.

_____ West AK, AZ, CA, CO, HI, ID, MT, NV, NM, OR, UT, WA, WY.

3. How many total responses does your department handle annually? (Please include all fire department responses including fire department emergency medical responses if provided, haz mat, service calls, false alarms, etc.).

_____.

4. How many interior structure fires does your department handle annually?

_____

5. How many units are dispatched to a structure fire in your department?

_____

6. How many personnel are assigned to each company unit in your department?

_____

_____

_____

_____

Does OSHA regulate your state? YES_____NO_____

If not, are you regulated by a state plan that includes OSHA 29 CFR paragraph (g)(3)

and (4) or a similar 2 in 2 out requirement? YES_____ NO_____

If the answer to the last question is no, do you follow a policy of 2 in 2 out anyway?

YES_____ NO_____

7. What policy changes were made to comply with 29 CFR? (Include a copy of the regulation if possible.) Only the ruling regarding entrance into IDLH environments are referred to here.

_____

_____

8. What operational changes were made to comply with 29 CFR? (Include copy if necessary.)

_____

APPENDIX C

OPERATIONAL PROCDURES

RAPID INTERVENTION CREW(S)

Purpose To provide on-scene personnel for the rapid rescue of members in the event that members become lost, trapped, injured, or any other event that may require rapid response of rescue personnel.

Command Responsibility It is the Incident Commander's responsibility to maintain, throughout an incident, the resources necessary to respond to changing situations. Although every possible situation cannot be anticipated, the need for the rescue of members must be considered in all tactical planning.

Command Report The initial Incident Commander shall, upon arrival at the scene, transmit a condition for incidents of fire or hazardous material nature. A Haz Mat condition II or a Fire condition II or higher announcement shall serve as notification for initiation of a Rapid Intervention Crew. Fire conditions and hazardous materials conditions are defined elsewhere in this manual.

Definition of Terms

Hazard Zone The area where members might be exposed to an IDLH atmosphere.

IDLH (Immediately Dangerous to Life or Health) An atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere.

Interior Structural Firefighting The physical activity of fire suppression, rescue or both, inside of buildings or enclosed structures which are involved in a fire situation beyond the incipient stage.

Incipient Stage Fire Fire which is in the initial or beginning stage and which can be controlled or extinguished by portable fire extinguishers, class II standpipe or small hose systems without the need for protective clothing or breathing apparatus.

Incident Safety Operations are limited to those that can be safely performed by the personnel on the scene. To ensure safety and provide rescue capability, the following shall be adhered to:

Team Concept Members operating in hazardous zones at incidents considered to have

IDLH atmospheres shall operate in teams of two or more, remain in visual, voice or tether line contact with all members of the team and radio contact with a rapid intervention team member outside the hazard zone.

Crew Integrity Crew members shall remain in close proximity to each other to provide assistance in case of emergency. Communication must be maintained in order to coordinate activities.

Initial Stages of an Incident At all incidents where an IDLH atmosphere is likely to exist. (Interior structure fires that are beyond the incipient stage are IDLH environments. The interior of any such structure is the minimal hazard zone.) No less than a team of two

members shall enter the hazard zone. No team shall enter the hazard zone until a rapid intervention crew, wearing full personal protective equipment and SCBA is assembled outside the hazard zone.

Rapid Intervention Crew (RIC) In order to ensure the availability of personnel to provide rapid rescue of members operating at emergency incidents, Rapid Intervention Crews (RICs) shall be formed at all incidents with IDLH atmospheres. The RIC shall retain visual, voice, signal line or radio communication with any interior teams until relieved of RIC duty. Rapid Intervention Crews shall be made up of a minimum of two personnel. All members of a RIC shall wear full personal protective equipment and SCBA at all times. (It is permissible to delay donning the SCBA mask until entering the hazard zone.) It shall be the duty of one member of a RIC to monitor any team(s) entering the hazard zone. That member shall have no other duty until RIC deployment for rescue purposes. The other member(s) may have other tasks so long as no jeopardy of safety or health of other members would occur should that task be abandoned suddenly to perform rescue duty. The individual responsible for operation of a pump or aerial in use at the incident shall be considered unavailable.

Exceptions Two exceptions are permissible for not having an RIC assigned prior to entry into a hazard zone and to the team concept.

Immediate Life Hazard The RIC and Team concept shall not stop members from performing rescue of persons in immediate danger of death or serious injury. Before sufficient personnel are on scene to have two members outside and two members to enter a hazard zone. However, RIC shall be assembled as quickly as possible.

NOTE: Dispatch shall be notified by radio on the operating channel assigned to the incident of any exception for purposes of immediate life hazard to the RIC in place rule. Any exception must be fully explained in the narrative section of the TEXFIR report and an incident report form shall be filled out.

Incipient Stage It is permissible for the IC to assign a single member to assess the progress, location and access to a fire in the incipient stage.

Rescue Mode Whenever a crew or individual is missing, trapped or injured a rescue situation exists. The radio message "MAYDAY" shall be transmitted three times by either the member discovering the situation or the member who is trapped or injured. The mayday transmission shall be followed by a description and the location of the emergency and the transmitter's identification. The MAYDAY transmission shall serve as dispatch and IC notification of emergency rescue initiation. The MAYDAY transmission shall be acknowledged first by the RIC leader, second by the Incident Commander and last by dispatch. This allows for the RIC to seek further information if necessary. If no further information is needed by the RIC leader the radio transmission shall be "RIC received MAYDAY. We are enroute." This reply serves as notice to the IC to provide any assistance needed for rescue and to assign personnel to backup RIC duty.

PAR Initiation The initiation of a Personnel Accountability Roll Call (See Section 7.11 in this manual.) by the Incident Commander shall immediately follow a "MAYDAY" transmission.